PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference NM 5199-01WO	FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/IB2002/001605	International filing date *(day/month/year)* 08-05-2002	Priority date *(day/month/year)* - - -

International Patent Classification (IPC) or national classification and IPC

H04L 12/56

Applicant

Nokia Corporation et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of **5** sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *(sent to the applicant and to the International Bureau)* a total of **4** sheets, as follows:

      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) _____ , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   ☒ Box No. I   Basis of the report

   ☐ Box No. II   Priority

   ☐ Box No. III   Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   ☐ Box No. IV   Lack of unity of invention

   ☒ Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   ☐ Box No. VI   Certain documents cited

   ☐ Box No. VII   Certain defects in the international application

   ☐ Box No. VIII   Certain observations on the international application

Date of submission of the demand 06-10-2003	Date of completion of this report 10-08-2004
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Form PCT/IPEA/409 (cover sheet) (January 2004)

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Box No. I	Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

    ☐ This report is based on a translation from the original language into the following language _____ , which is the language of a translation furnished for the purposes of:

        ☐ international search (under Rules 12.3 and 23.1(b))

        ☐ publication of the international application (under Rule 12.4)

        ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

    ☐ the international application as originally filed/furnished

    ☒ the description:

        pages __1-11__ _____ as originally filed/furnished

        pages* _____ received by this Authority on _____

        pages* _____ received by this Authority on _____

    ☒ the claims:

        pages _____ as originally filed/furnished

        pages* _____ as amended (together with any statement) under Article 19

        pages* __1-4__ _____ received by this Authority on __25-03-2004__

        pages* _____ received by this Authority on _____

    ☒ the drawings:

        pages __1-3__ _____ as originally filed/furnished

        pages* _____ received by this Authority on _____

        pages* _____ received by this Authority on _____

    ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

        ☐ the description, pages _____

        ☐ the claims, Nos. _____

        ☐ the drawings, sheets/figs _____

        ☐ the sequence listing *(specify)*: _____

        ☐ any table(s) related to the sequence listing *(specify)*: _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

        ☐ the description, pages _____

        ☐ the claims, Nos. _____

        ☐ the drawings, sheets/figs _____

        ☐ the sequence listing *(specify)*: _____

        ☐ any table(s) related to the sequence listing *(specify)*: _____

*   *If item 4 applies, some or all of those sheets may be marked "superseded."*

Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims		NO
Inventive step (IS)	Claims	1-24	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The object of the claimed invention is to provide a method and network node for distributing network parameter information, by means of which a more efficient and scalable distribution scheme can be provided.

Documents cited in the international search report:

D1: CIDON I ET AL: "CONTROL MECHANISM FOR HIGH SPEED NETWORKS", INTERNATIONAL CONFERENCE ON COMMUNICATIONS. INCLUDING SUPERCOMM TECHNICAL SESSIONS. ATLANTA, APR. 15-19, 1990, NEW YORK, IEEE, US, vol. 2, 15 April 1990, pages 259-263.
D2: WO 00 70782, A
D3: YUM T-S P ET AL: "Multicast source routing in packet-switched networks", NETWORKING IN THE NINETIES. BAL HARBOUR, APR. 7-11, 1991, PROCEEDINGS OF THE COMPUTER AND COMMUNICATIONS SOCIETIES. (INFOCOM), NEW YORK, IEEE, US, vol. 2 CONF. 10, 7 April 1991, pages 1284-1288.

Document D1 is considered to represent the closest prior art. It is pointed out in D1 that the high speed of communication links and the altered nature of carried traffic have considerably affected the design and implementation of packet switched networks. The authors explore the effect on the control procedures within the network, specifically focusing on the lessons learned from the prototype PARIS network. The key design philosophy for both the steady-state control and the connection control is described. It is believed that most of the conclusions are general and can be applied to any network, including ATM (asynchronous transfer mode)-based systems (see whole document).

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

D2 relates to a method and selector for performing selection in a communication system. Frames received by base stations (base stations) are assigned a frame-quality indicator (FQI) by the base station. FQI information for all frames received is continuously backhauled to a switch. The switch side hauls the FQI information to a call anchoring base station, where a determination of a base station with the best FQI for each frame takes place. Once the anchoring base station determines a base station with the best FQI for a particular frame, the anchoring base station sends a FORWARD_FRAME message to the base station with the best FQI, or, if the anchoring base station is the base station with the best FQI, nothing is sent to the other base stations. Once the FORWARD_FRAME message is received by a base station, the base station immediately forwards the frame (identified by the frame number) to the switch. The switch then routes the selected frame accordingly (page 1, line 1 -page 2, line 10; page 5, line 10- line 27; page 6, line 12- line 26; page 9, line 34- page 10, line 28 and figure 1).

An address coding mechanism is presented, in D3, for multicast source routing packets in packet-switched networks. A simple algorithm for processing these address codes at intermediate output link adaptors is presented. It involves only the recognition of a particular link label at the front part of the address code and the stripping off of a front segment of the address code and so can easily be implemented in hardware.

The invention according to amended independent claims 1, 18 and 22 differs from D1 by determining the shortest paths from network node to other nodes and by letting the signalling between IP based stations to be performed via an interface supporting both control plane signalling and user plane traffic. Also, in view of the fact that the topology broadcast scheme described in D1 is implemented as a header-based routing mechanism, each desired route along the spanning tree structure can be set at the initial node by correspondingly modifying the header address. Hence, the topology update messages sent by the initial network node are the same for each neighbour node on the topology spanning tree. Moreover, the neighbour nodes merely forward the received topology

.../...

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

update message over the links. In contrast thereto, the claimed network node generates for each of its offspring nodes a respective or dedicated updating information which is individually generated based on the topology information stored at the network node.

None of the cited documents D1-D3 suggests providing a dedicated network parameter information for each offspring node. Also, a change of the broadcast network parameter information at intermediate offspring nodes is neither anticipated nor rendered obvious by the cited prior art.

Thus, the invention according to the amended independent claims 1, 18 and 22 is novel, is considered to involve an inventive step. The invention is industrially applicable.

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New Claims

1.   A method of distributing a network parameter information among
network nodes (A - E) of a radio access network, said method com-
prising the steps of:

    a) determining based on a topology information of said radio ac-
cess network a spanning tree of routing paths corresponding to
the shortest paths from said network node to other nodes;

    b) detecting a network parameter change in a network node of said
transmission network; and

    c) distributing said network parameter information indicating said
network parameter change from said network node to said other
nodes in accordance with said spanning tree,

    d) wherein said network node generates for each of its offspring
nodes a respective updating information and sends said respec-
tive updating information to all offspring nodes.

AMENDED SHEET

2. A method according to claim 1, wherein said network parameter information is used in a network operation and management procedure in a radio access network.

3. A method according to claim 2, wherein said network operation and management procedure is an MDC point selection procedure.

4. A method according to any one of the preceding claims, wherein said network parameter information relates to a QoS-related parameter.

5. A method according to claim 4, wherein said network parameter information comprises at least one of a link state, a link utilization, a node utilization, and a macro diversity combining load.

6. A method according to any one of the preceding claims, further comprising the step of deriving said topology information from at least one routing table.

7. A method according to claim 6, wherein one routing table is provided for each network node.

8. A method according to claim 7, wherein said one routing table provides a branch information for each offspring node of said network node.

9. A method according to claim 8, wherein said branch information indicates branches of the concerned offspring node.

10. A method according to any one of the preceding claims, further comprising the step of deriving said topology information from a link state database of a routing protocol of said transmission network.

11. A method according to any one of claims 1 to 9, further comprising the step of obtaining said topology information by running a flooding scheme and a shortest-path-first algorithm.

AMENDED SHEET

12. A method according to any one of the preceding claims, further comprising the step of deciding on those parameters to be included in said network parameter information based on said topology information.

13. A method according to any one of the preceding claims, wherein said network parameter information comprises said updating information sent to each offspring node.

14. A method according to claim 13, wherein said updating information comprises a branch information, a parameter update information and a node identification of the network node at which said network parameter change has occurred.

15. A method according to claim 13 or 14, further comprising the step of distributing a received updating information from an offspring node of said network node to an offspring node of said offspring node based on said branch information.

16. A method according to any one of claims 13 to 15, further comprising the step of updating a parameter information stored at said offspring node using said updating information.

17. A method according to claim 1, wherein said transmission network is a radio access network based on internet protocol technology.

18. A network node for distributing a network parameter information to other network nodes of a transmission network, said network node being arranged to detect a change in a network parameter related to said network node, and to distribute said network parameter information indicating said network parameter change towards said other network nodes in response to said detection and in accordance with a spanning tree of routing paths corresponding to the shortest paths from said network node to said other nodes, wherein said network node generates for each of its offspring nodes a re-

AMENDED SHEET

spective updating information and sends said respective updating information to all offspring nodes.

19. A network node according to claim 18, wherein said spanning tree is derived from a topology information of said transmission network.

20. A network node according to claim 19, wherein said network is arranged to decide on those parameters to be included in said network parameter information based on said topology information.

21. A network node according to any one of claims 18 to 20, wherein said network node is a base station device of a radio access network.

22. A network node for distributing a network parameter information to other network nodes of a radio access network, said network node being arranged to receive a network parameter information from an upper node, to update a stored parameter information according to said received network parameter information, and to distribute said network parameter information to its offspring network nodes based on a branch information included in said network parameter information, said branch information being derived from a spanning tree routing topology, wherein said network node is arranged to update said branch information in said network parameter information before distributing said network parameter information to said other nodes.

23. A network node according to claim 22, wherein said other nodes are offspring nodes of said network node.

24. A network node according to claim 22 or 23, wherein said network node is a base station device of a radio access network